

REMARKS

The present amendment is submitted in response to the Office Action dated August 28, 2003, which set a three-month period for response, making this amendment due by November 28, 2003.

Claims 33-62 are pending in this application.

In the Office Action, the drawings were objected to as failing to comply with 37 CFR 1.84(p)(5) for not including reference signs mentioned in the description. The specification and claims 1 and 54 were objected to for various informalities. Claims 33, 35, and 54 were rejected under 35 U.S.C. 112, second paragraph, as being indefinite. Claims 33-46 and 51-53 stand rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 5,879,576 to Wada et al. Claims 54-59 were rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 5,964,952 to Kunze-Concewitz.

The Applicants note with appreciation the indicated allowability of claims 47-50 and 60-62 if rewritten to overcome the rejections under 35 U.S.C. 112, second paragraph, and to include the limitations of the base claim and any intervening claims.

Turning first to the objection to the drawings, the Applicants respectfully disagree that the substrate 3 and the base 10 are not shown in Figure 5. The Applicants direct the Examiner's attention to Figure 5, where element 3 is indicated in the upper right corner of the drawing and where element 10 is indicated in the lower left corner of the drawing.

The specification has been amended on page 18 to correct the noted typographical error.

Claims 1 and 54 have been amended to more clearly define that the at least one first nozzle and second nozzles are controlled separately. Claim 54 has been further amended to define the angle of less than 90° "relative to the nozzle plate".

With regard to the objection to the specification as failing to provide proper antecedent basis for the recitation of the "insert" of claim 45, the Applicants respectfully direct the

Examiner's attention to the original specification on page 11, lines 8-17, as well as Figures 1 and 3, which illustrate the insert. Page 11 provides the following description:

An insert 35 with a connecting adaptor 36 is arranged in the central opening formed by the flange 20. The insert 35 can be secured with a welding seam, a screw connection, or other suitable connecting means. An end face 37 of the insert 35 is aligned with an upper side of the nozzle plate 17. In the middle of this end face 37 of the insert 35, a nozzle 38 is provided, which, while not represented in the figures, is connected with the connecting adaptor 36. The connecting adaptor 36 is connected with a line (not illustrated), in order to lead a rinsing fluid through the nozzle 38 and apply a vacuum to the nozzle 38, as will be described below.

The Examiner also rejected claim 45 under Section 112 that the term "insert" is not supported in the specification. As a practitioner would understand from the above disclosure, the term "insert" is a component, which is separate from the base defined in claim 44 and which can be inserted into this base, that is, it is not formed to be integral with the base.

Therefore, the Applicants respectfully submit that the term "insert" is adequately disclosed in the specification.

Looking now at the substantive rejection of claims 33-46 and 51-53 under Section 103, the Applicants respectfully disagree that the cited reference to Wada et al makes obvious the present invention. This reference, or its Japanese equivalent, was already cited in the international patent examination of the present application, and the claims, as presented in this application, were found to be allowable over the Wada reference in the international patent process.

Wada et al disclose a substrate treatment device, in which a development solution is applied via a first nozzle, arranged centrically to a substrate, to the substrate. By means of a rotation of the substrate, the development solution is radially, outwardly flung by centrifugal force and simultaneously distributed. After the application of the development solution, a

cleaning liquid is applied from a succession of cleaning nozzles onto the rotating substrate, whereby the cleaning nozzles are inclined with reference to the surface of the substrate and have overlapping spraying regions. The first nozzle 26, arranged centrally to the nozzle 26, as well as the plurality of cleaning nozzles 27 are commonly arranged on a pivotable support arm 25.

In this regard, however, the support arm 25 does not form a nozzle plate according to the present invention, since the support arm 25, on the one hand, is not a plate element according to claim 33 of the present application. In addition, also no nozzles are arranged in the support arm. The nozzle 26 as well as also the nozzles 27 are spaced from the support arm 25 and are merely held on the support arm via a corresponding holding element, as is clearly provided in Figure 5 of Wada et al. An arrangement of nozzles in a nozzle plate, therefore, is obviously not provided in Wada et al.

In addition, the first nozzle 26 directed centrally to the substrate is not provided centered to the nozzle plate. The above features, however, are essential for the present invention, as will be explained subsequently. The use of a nozzle plate, that is, a flat element, ensures a good radial flow of a treatment fluid exiting from the first centric nozzle along the surface of the substrate, without having to rotate the substrate. The nozzle plate makes possible, in particular, also a treatment of a bottom surface of the substrate, since the radial flow takes place between the nozzle plate and the substrate. A corresponding clarification has therefore been added via amendment to claim 33 in this amendment.

The use of a corresponding nozzle plate is also not suggested by Wada et al, since, here, a radial flow of the development solution is produced via a rotation of the substrate. The provision of a nozzle plate for forming a radial flow between the substrate and nozzle plate is therefore not disclosed nor suggested by the Wada et al reference.

The arrangement of a plurality of second nozzles in a nozzle plate is likewise not suggested or disclosed in Wada et al. The arrangement of the plurality of second nozzles directly in the nozzle plate with an angle of less than 90° relative thereto, however, makes

possible the deflection of the radial flow formed between the nozzle plate and the substrate. In this connection, it should be noted that the nozzles 27 in the Wada et al reference are not provided in order to provide a spiral-shaped, outwardly extending flow of the development solution applied by the first nozzle 26. This is provided, for example, in Wada et al in column 6, lines 21-50. Here, it is specifically provided that the development solution is first applied and is flung outwardly by the centrifugal force of the rotating substrate. In this regard, a uniform distribution of the development solution on the entire substrate is achieved.

After the application of the development solution, the substrate is washed, whereby at this point in time, no further development solution is applied. Thus, also, essentially, no radial flow is provided. Upon washing, the nozzles 27 are arranged inclined with reference to a rotation direction of the substrate (see Fig. 6 of Wada), in order to provide a long dwell time of the rinsing fluid on the substrate.

With the present invention, by means of the inventive arrangement of elements, the radial flow of a fluid dispensed from the first nozzle is dispersed in a flow extending spirally outward, in order to increase the dwell time of the first fluid on the substrate. This type of dispensing of a radial flow, however, is not provided by Wada et al, and merely the dwell time of the (second) washing liquid on the substrate is increased by means of the inclined position of the nozzle 27.

The subject matter of claim 33 of the present application differs, therefore, clearly from the device according to Wada et al. Thus, claim 33 is allowable over this reference, as are dependent claims 34 through 53.

Method claim 54 was rejected as unpatentable over the reference to Kunze-Concewitz. The Applicants also respectfully disagree with this conclusion.

Kunze-Concewitz shows a method or a device of cleaning contaminated surfaces with water and steam. Thus, first a water stream is directed onto the substrate via nozzle 46 inclined relative to the substrate, in order to form a water film 47 on the surface of the

substrate 21. In this manner, the water is applied via a plurality of parallel-arranged nozzles over the entire width of the substrate. In addition, the water is applied along a longitudinal center line of the substrate, so that it is distributed outwardly from the longitudinal center line (see Figure 12 in connection with Figure 15). At the same time, a second nozzle 1, which likewise extends over the entire width of the substrate, sprays a steam jet 16 directly into the water film 47. In this manner, the steam jet 16 extends perpendicular to the substrate surface and to the surface of the water film. By means of the steam, bubbles are produced in the water film 47, which immediately collapse or are burst on the surface of the water film 47, in order to produce an impulse within the water film 47. The water vapor 16 is not in the position to affect the flow direction of the water film 47, since it is arranged perpendicular to the substrate, and also is not provided for this purpose.

In contrast to the method of Kunze-Concewitz, the method of the present invention as defined in amended claim 54 relates to a method for the treatment of substrates, which includes the following steps:

providing at least one first nozzle, and a nozzle plate disposed parallel to a substrate relative to said nozzle plate, wherein said at least one first nozzle is disposed essentially centrally relative to said substrate and to said nozzle plate;

conducting a fluid, via said at least one first nozzle, at a right angle onto a substrate surface that is to be treated so that fluid striking said substrate is deflected into a radial flow between said substrate and said nozzle plate;

providing a plurality of second nozzles disposed in said nozzle plate at an angle of less than 90° relative to the nozzle plate, wherein said second nozzles and the at least one first nozzle are separately controlled;

conducting a fluid transverse to said radial flow, onto said substrate surface

that is to be treated via said plurality of second nozzles, wherein fluid is simultaneously conducted onto said substrate surface by said first and second nozzles; and

wherein said second nozzles are distributed over said nozzle plate in such a way that said radial flow is deflected into a spirally outwardly extending flow.

The method according to the present invention therefore differs markedly in the above features from the Kunze-Concewitz method, in that a nozzle plate arranged parallel to the substrate is provided, and that at least a first nozzle is provided substantially central relative to the substrate and to the nozzle plate. Kunze-Concewitz shows neither a nozzle plate nor a first nozzle, which is arranged substantially central relative to the substrate and the nozzle plate. The nozzle 1, as well as the nozzle 46, are neither arranged centrally relative to the substrate nor centrally relative to a nozzle plate, which is completely absent in the Kunze-Concewitz reference.

In addition, with Kunze-Concewitz, no fluid is conducted via a first nozzle with a right angle relative to the nozzle plate onto a substrate surface, so that the fluid impinging on the substrate is dispensed in a radial flow between the substrate and the nozzle plate. The only fluid that is conducted with a right angle onto the substrate is the steam jet 16. This, however, should not impinge directly onto the substrate and be dispensed in a radial flow. In addition, the water vapor should produce bubbles in a water film 47 on the substrate, which with collapsing or bursting, produce impulses in the water film. In addition, with Kunze-Concewitz, no plurality of second nozzles is provided in a nozzle plate. Also, the fluid conducted via the second nozzles onto the substrate is not directed transverse to a radial flow on the substrate surface. A corresponding radial flow generally is not provided, and if anything, produces a flow of a fluid through the nozzles 46.

The individual feature that is known from Kunze-Concewitz is the detail that a fluid is

simultaneously conducted via first and second nozzles onto the surface of a substrate to be treated.

The method according to Kunze-Concewitz also fails to provide the feature that the second nozzles are distributed over the nozzle plate in such a manner that a radial flow originating from the first nozzle is conducted in a spiral-shaped, outwardly directed flow.

The method according to the present invention differs, then, specifically from the method known from Kunze-Concewitz and not only with reference to the use of a nozzle plate and the arrangement of the first nozzle essentially central relative to the nozzle plate. In addition, it should be noted that these features alone render the present invention patentable over the Kunze-Concewitz patent, since the use of a nozzle plate in combination with a centrally arranged nozzle is suited for forming a uniform radial flow between the substrate and the nozzle plate. A nozzle directed at a substrate in this form is not provided by this reference.

The method of the present invention as defined in claim 54, therefore, is patentably distinguishable over the Kunze-Concewitz and is allowable. Likewise, dependent claims 55-62 are also allowable over this reference.

For the reasons set forth above, the Applicants respectfully submit that claims 33-62 are patentable over the cited references. The Applicants further request withdrawal of the rejections under 35 U.S.C. 103 and reconsideration of the claims as herein amended.

In light of the foregoing arguments in support of patentability, the Applicants respectfully submit that this application stands in condition for allowance. Action to this end is courteously solicited.

Should the Examiner have any further comments or suggestions, the undersigned would very much welcome a telephone call in order to discuss appropriate claim language that will place the application into condition for allowance.

Respectfully Submitted,

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